भारतीय मानक
Indian Standard

IS 16874 : 2018

वस्त्रादि — अग्निशामकों के लिए सुरक्षा दस्तानें — विशिष्टि

Textiles — Protective Gloves for Firefighters — Specification

ICS 13.340.10;13.340.40

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भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली–110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.org.in www.standardsbis.in

May 2018 **Price Group 6**

Textiles Protective Clothing Sectional Committee, TXD 32

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Textiles Protective Clothing Sectional Committee had been approved by the Textile Division Council.

It has been seen that gloves is perhaps one of the most misunderstood item among the clothing items worn by firefighters. But hand protection during firefighting is of paramount importance. Burns and other injuries to the hand, though lessened over the years, still represent a significant proportion of all fire ground injuries.

Where there are complaints about the different elements of the protective ensemble, often gloves top the list. Complaints include them being too bulky or too restrictive on hand movements. Gloves use the same principles of layering materials as applied to garments. Structural firefighting gloves employ the same functional three-layer construction as turnout gear. For gloves, there is a shell, which may be either leather or textile. Inside the shell is a moisture barrier or barrier layer that may be separate or combined with a thermal lining. All layers must work together to provide protection to the hands.

This standard prescribes six unique and distinct sizes of gloves and includes the general glove design, thermal, mechanical, barrier, ergonomic and optional visibility requirements for protective gloves designed to protect against injury in fire fighting operations.

In the formulation of this standard, considerable assistance has been derived from ISO 15383 : 2001 'Protective gloves for firefighting — Laboratory test methods and performance requirements' on the subject.

The Committee has reviewed the provisions of the following International Standards referred in this standard and has decided that it is acceptable for use in conjunction with this standard:

International Standard	*Title*
ISO 811 : 1981	Textile fabrics — Determination of resistance to water penetration — Hydrostatic pressure test
ISO 12127-1 : 2015	Clothing for protection against heat and flame — Determination of contact heat transmission through protective clothing or constituent materials : Part 1 Contact heat produced by heating cylinder
ISO 13994 : 2005	Clothing for protection against liquid chemicals — Determination of the resistance of protective clothing materials to penetration by liquids under pressure
ISO 13996 : 1999	Protective clothing — Mechanical properties — Determination of resistance to puncture
ISO 13997 : 1999	Protective clothing — Mechanical properties — Determination of resistance to cutting by sharp objects
ISO 17493 : 2016	Clothing and equipment for protection against heat — Test method for convective heat resistance using a hot air circulating oven

The composition of the Committee responsible for the formulation of this standard is given in Annex F.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

TEXTILES — PROTECTIVE GLOVES FOR FIREFIGHTERS — SPECIFICATION

1 SCOPE

This standard specifies test methods and minimum requirements for protective gloves to be worn during fire fighting and associated activities where there is a risk of heat and/or flame.

This standard includes the general glove design, thermal, mechanical, barrier, ergonomic and optional visibility requirements for protective gloves designed to protect against injury in fire fighting operations.

This standard does not cover protection for the head, torso, arms, legs and feet or protection of the hands against other hazards, for example chemical, biological, radiation and electrical hazards, except for limited, accidental exposure to fire ground chemicals and contaminated blood or body fluids. These aspects may be dealt with in other standards.

2 REFERENCES

The standards listed in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

For the purposes of this standard, the following definitions shall apply.

3.1 Component Assembly — Combination of all materials of a multi-layer glove presented exactly as the finished glove construction.

3.2 Drip — To run or fall in drops or blobs.

3.3 Firefighters' Protective Gloves — Specific gloves providing protection for the firefighters' hands and wrists.

3.4 Firefighters' Protective Clothing — Specific garments providing protection for the firefighters' upper and lower torso, neck, arms and legs, but excluding the head, hands and feet.

3.5 Cuff — That circular, flared or otherwise expanded part of the glove that extends beyond the opening of the glove body to cover the wrist area.

3.6 Glove Body — That part of the glove that extends from the tip of the fingers to 25 mm beyond the wrist crease.

3.7 Innermost Lining — Lining of the innermost face of a component assembly closest to the wearer's skin.

NOTE — Where the innermost lining forms part of the material combination, the material combination is regarded as the innermost lining

3.8 Melt — To liquefy a material by exposure to heat resulting in a non-reversible change.

NOTE — For the purposes of this standard, melting is observed as the response to heat as evidenced by flowing or dripping.

3.9 Main Seam — Seam that is necessary for the integrity of the glove.

3.10 Moisture Barrier — That portion of the component assembly designed to prevent the transfer of liquids.

NOTE — Moisture barriers might not prevent the passage of chemical, biological or radiological agents through the glove. Such incidents should be handled with appropriate chemical protective clothing and procedures.

3.11 Outer Material — Outermost material of which the protective glove is made.

3.12 Seam — Any method of permanent fastening between two or more pieces of material.

3.13 Wristlet — Circular, close-fitting part of the glove, usually made of knitted material, that extends beyond the opening of the glove body to cover the wrist area.

NOTE — May be contained within a cuff

4 DESIGN REQUIREMENTS

4.1 Component Assembly

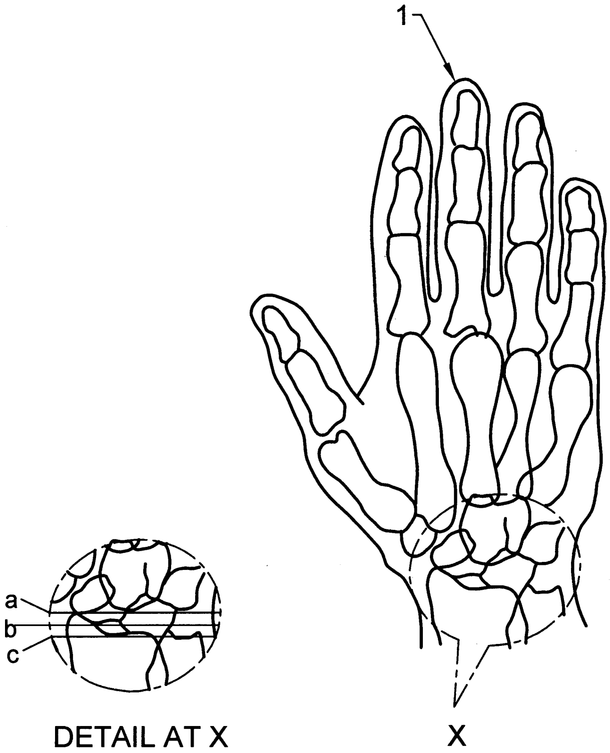
Gloves shall consist of a component assembly meeting the performance requirements of this standard. This component assembly shall be permitted to be configured as a continuous or joined single layer, or as continuous or joined multiple layers.

4.2 Glove Body Length

The glove body shall extend circumferentially beyond the wrist crease not less than 25 mm. The location of the wrist crease shall be determined as shown in Fig. 1.

4.3 Wristlet or Cuff

Gloves shall be permitted to be provided with either a cuff or a wristlet or both. Where gloves are provided with a cuff or a wristlet, the sample glove body and the cuff or wristlet shall extend circumferentially at least 50 mm beyond the wrist crease, taking into consideration the requirement specified in **4.2**. Where



Key

1 — Dactylion III
a — Stylion
b — Wrist Crease
c — Proximal Edge of Navicular

FIG. 1 ANATOMICAL LANDMARKS AT BASE OF HAND

gloves are not provided with a cuff or a wristlet, the sample glove body shall extend circumferentially at least 50 mm beyond the wrist crease which is a 25 mm addition to the requirement specified in **4.2**.

4.4 Glove Sizing

4.4.1 *Minimum Sizing*

Gloves shall be provided in a minimum of 6 unique and distinct sizes and minimum length of the gloves shall be in accordance with Table 1.

NOTE — Sizes of the gloves are with respect to the sizes of the hand they are to fit. The details of hand dimensions and its method of measurement are given in **4.4.2** for guidance only.

Table 1 Minimum Length of Protective Gloves for Firefighters
(*Clause* 4.4.1)

Sl No.	Glove Size	Fits	Length of Glove, *Min* mm
(1)	(2)	(3)	(4)
i)	6	Hands size 6	260
ii)	7	Hands size 7	270
iii)	8	Hands size 8	280
iv)	9	Hands size 9	290
v)	10	Hands size 10	305
vi)	11	Hands size 11	315

4.4.2 *Hand Dimensions (for Guidance)*

4.4.2.1 Hand dimensions for selection of proper glove size shall consist of measuring two dimensions that is hand circumference and hand length, as shown in Fig. 2. The hand dimensions are given in Table 2 for guidance only.

NOTE — The intent of this requirement is to allow manufacturers to report information to the user that assists in their selection of the appropriate size.

Table 2 Sizes of Hands
(*Clause* 4.4.2.1)

Sl No.	Hand Size	Hand Circumference mm	Hand Length mm
(1)	(2)	(3)	(4)
i)	6	152	160
ii)	7	178	171
iii)	8	203	182
iv)	9	229	192
v)	10	254	204
vi)	11	279	215

4.4.2.2 Hand circumference shall be measured by placing the measuring tape on a table or other flat surface with the numerals facing downward. The subject shall place the right hand, palm down and fingers together, in the middle of the tape so that the tape can pass straight across the knuckles (metacarpals). The circumference shall be measured to the nearest millimetre, 20 mm from the crotch between thumb and index finger as shown in Fig. 2.

4.4.2.3 Hand length shall be measured by placing the subject's hand, palm down, on a piece of paper with the fingers together and the hand and arm in a straight line. The thumb shall be fully abducted, extended away from the palm as far as possible. The paper shall be marked at the tip of the third, or middle, finger. A pencil mark shall be placed in the notch at the base of the thumb where the thumb joins the wrist. The straight line distance between the two points shall be measured to the nearest millimetre, as shown in Fig. 2.

4.4.3 *Marking of Glove Size*

Glove size shall be indicated on the label.

NOTE — Manufacturers should also provide information to the end-user or purchaser on how they have defined their sizes in terms of hand length and circumference.

4.5 *p*H Value

*p*H value of gloves shall be greater than 3.5 and less than 9.5. *p*H shall be determined by the method specified in IS 16258 for leather gloves (**8.3** and **8.4** of IS 16258 shall not apply) and IS 1390 for other materials. The test piece shall be cut from the palm area of the gloves. If other parts of the glove are made of different materials, then each material shall be tested separately and shall meet the above requirement. If gloves are made of more than one layer, all layers shall be tested together.

4.6 Leather Chromium VI Content

Leather, if used in the construction of gloves, shall have a Chromium (VI) content of less than 10 mg/kg when tested in accordance with method specified in IS 16259.

4.7 Other Design Requirements

Gloves shall be designed to restrict the entry of embers or foreign particles through the glove openings. Gloves shall be compatible with the sleeves of the firefighters' protective clothing used. Any labels or accessories shall not adversely affect the performance of the gloves or present a hazard to the wearer.

5 SAMPLING AND PRE-TREATMENT

5.1 Sampling Levels

Sampling levels for testing and inspection shall be established by the responsible testing laboratory and the manufacturer in order to assure a reasonable and acceptable reliability at a reasonable and acceptable confidence level that products certified as being compliant with this standard are, in fact, compliant. Sampling and criteria for conformity shall be as given in Annex B.

5.2 Inspection

Inspection for determining compliance with the design requirements specified in **4** shall be performed on whole gloves.

5.3 Testing

5.3.1 *Specimens*

Testing for determining material and component compliance with the requirements specified in **6** shall be performed on samples representative of materials and components used in the actual construction of the protective glove. If suitably sized representative

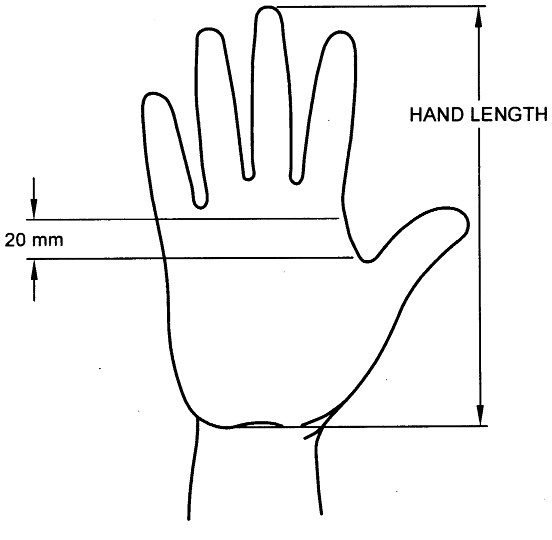


FIG. 2 METHOD OF MEASURING HAND DIMENSIONS FOR SELECTION OF PROPER GLOVE

materials and components for the respective test method cannot be obtained, then samples from the glove shall be used as specified in the performance requirement. The responsible testing laboratory organization shall be permitted to also use sample materials cut from representative protective gloves.

5.3.2 *Exposure Surface*

In all surface tests, the outermost surface shall be exposed.

5.3.3 *Interpretation Criteria*

In all tests involving measurements, the determination of compliance shall be based on the mean value.

5.4 Pre-treatments

5.4.1 *Washing Pre-treatment*

When pre-treatment is specified as part of the test procedure or performance requirement, then the test materials shall be cycled through five washings and five dryings. Washing shall be carried out by procedure 2A at (60 ± 3)°C using a front loading horizontal drum machine with a detergent which achieves a *p*H of 7.0 and drying shall be carried out by procedure E (tumble drying) of IS 15370 unless otherwise specified in the care labelling. A total of five washing and drying cycles shall be used. A laundry bag shall not be used. After the five washing and drying cycles, sample gloves shall be donned by a test subject and shall be flexed by making a tight fist 10 times during a 30 s period.

NOTE — Washing pre-treatment is not applicable for leather gloves.

5.4.2 *Dry Conditioning*

Sample gloves and sample specimens shall be conditioned at a temperature of (27 ± 2)°C and at a relative humidity of (65 ± 5) percent for at least 24 h in accordance with IS 6359. Sample gloves and sample specimens shall be tested within 5 min of removal from conditioning.

NOTE — This conditioning is used in some cases after washing pre-treatment to ensure that the gloves are totally dry before testing.

5.4.3 *Wet Conditioning*

Sample gloves or sample specimens shall be conditioned by completely immersing the glove or the glove specimen in water at a temperature of (27 ± 2)°C for 2 min. If gloves are used, the glove specimen shall be first filled with water prior to immersion. Sample gloves or sample specimens shall be removed from the water, hung in a vertical position for 5 min with the fingers uppermost, laid horizontal with textile blotting paper both under and over the specimen, under a pressure of 3.5 kPa for a period of 20 min. Sample gloves or sample specimens shall be tested within 5 min of conditioning.

6 PERFORMANCE REQUIREMENTS

6.1 General Requirements

6.1.1 All firefighter gloves shall meet the thermal, mechanical, barrier and ergonomic requirements as specified in **6.2** to **6.5** and if required, optional requirement of visibility (*see* **6.6**).

6.1.2 After each thermal test (*see* **6.2.1** to **6.2.5**), the innermost lining material shall be visually examined. The glove is deemed to have failed the test, if there is evidence of melting.

6.2 Thermal Requirements

6.2.1 *Flame Resistance*

6.2.1.1 The glove component assembly, when tested in accordance with IS 15758 (Part 4), using the procedures for face ignition and bottom ignition, before and after the pre-treatment specified in **5.4.1** followed by the pre-treatment specified in **5.4.2**, shall meet the following requirements:

a) No specimen shall exhibit flaming at top or either side edge;
b) No specimen shall exhibit hole formation in any layer;
c) No specimen shall produce flaming or molten debris;
d) The mean value of after flame time shall be < 2 s; and
e) The mean value of the afterglow time shall be < 2 s.

6.2.1.2 If suitably sized representative materials cannot be obtained, then the whole glove shall be used for testing. The flame shall be contacted on the glove at the palm side, back side and fingers. If the glove assembly incorporates wristlet material, this material shall be tested separately applying the flame to the outer surface of the wristlet material.

6.2.1.3 If the glove assembly incorporates seams, specimens of component assembly containing seams shall be tested separately by applying the flame to the seam portion of the component assembly with the seam oriented vertically. Performance shall be determined using the poorest results from all areas of the glove that are tested.

6.2.2 *Heat Transfer (Flame Exposure)*

6.2.2.1 The glove component assembly, when tested in accordance with IS 15758 (Part 1) shall conform to the following performance requirements:

$$\mathrm{HTI}_{24} > 13\ \mathrm{s}\ \text{and}\ (\mathrm{HTI}_{24} - \mathrm{HTI}_{12}) > 4\ \mathrm{s}$$

6.2.2.2 Testing shall be performed on the glove component assembly after the following pre-treatments:

a) after the pre-treatment as specified in **5.4.2**.
b) after the pre-treatment as specified in **5.4.1** and then followed by the pre-treatment specified in **5.4.2**.

6.2.2.3 Where different, the palm and back sides of the glove shall be tested. The performance of the glove shall be determined using the lowest mean results for each side.

6.2.3 *Heat Transfer (Radiant Exposure)*

6.2.3.1 The glove component assembly, when tested in accordance with Method B of IS 15758 (Part 2), with the heat flux density of 40 kW/m^2, shall conform to the following performance requirements:

$$t_2 \geq 22 \text{ s and } (t_{24} - t_{12}) \geq 6 \text{ s}$$

6.2.3.2 The glove component assembly shall have a mean transmission factor ≤ 60 percent. Testing shall be performed on the glove component assembly after the following pre-treatments:

a) after the pre-treatment specified in **5.4.2**.
b) after the pre-treatment specified in **5.4.1** and then followed by the pre-treatment specified in **5.4.2**.

6.2.3.3 Where different, the palm and back sides of the glove shall be tested. The performance of the glove shall be determined using the lowest mean results for each side.

6.2.4 *Heat Transfer (Conductive Exposure)*

6.2.4.1 The glove component assembly, when tested in accordance with ISO 12127-1 at a contact temperature of 250°C, shall conform to the following performance requirements:

$$t_t \geq 10 \text{ s}$$

6.2.4.2 Testing shall be performed on the glove component assembly after the following pre-treatments:

a) after the pre-treatment specified in **5.4.2**.
b) after the pre-treatment specified in **5.4.1** and then followed by the pre-treatment specified in **5.4.2**.
c) after the pre-treatment specified in **5.4.1** and then followed by the pre-treatment specified in **5.4.3**.

6.2.4.3 Where different, the palm and back sides of the glove shall be tested. The performance of the glove shall be determined using the lowest mean results for each side.

6.2.5 *Heat Resistance*

6.2.5.1 Complete glove specimens, when tested in accordance with the method specified in ISO 17493, using the procedures for protective gloves at the test temperature of 180 ± 5°C and before and after the pre-treatment specified in **5.4.1**, shall not melt, separate or ignite, and shall not shrink more than 5 percent in length or width.

6.2.5.2 Specimens of the innermost lining of the glove body component assembly that is designed to come into contact with the wearer's skin, when tested in accordance with the method given in ISO 17493, using the procedure for flat textile or other sheet materials at the test temperature of 180 ± 5°C before and after the pre-treatment specified in **5.4.1**, shall not melt, separate or ignite.

6.3 Mechanical Requirements

6.3.1 *Abrasion Resistance*

6.3.1.1 Specimens of the outer material from the palm area of the glove body component assembly when tested in accordance with IS 12673 (Part 4) with a 300 g/m^2 finish glass paper (grade 100/F2) at a pressure of 9 kPa after the pre-treatment specified in **5.4.2**, shall not wear-through after 2 000 cycles.

6.3.1.2 Where different, the palm and back sides of the glove shall be tested. The performance of the glove shall be determined using the lowest mean results for each side.

6.3.2 *Cut Resistance*

6.3.2.1 Specimens of the outer material from the palm and back areas of the glove body component assembly when tested in accordance with ISO 13997 with a 20 mm blade stroke after the pre-treatments specified in **5.4.2** and **5.4.3**, shall have a minimum cut force of 2 N.

6.3.2.2 Where different, the palm and back sides of the glove shall be tested. The performance of the glove shall be determined using the lowest mean results for each side. Where cuffs or wristlets are provided, specimens of the glove cuff or glove wristlet component assembly shall be separately tested. The glove shall be classified on the poorest performance measured for the glove body and the cuff/wristlet.

6.3.3 *Tear Resistance*

6.3.3.1 Specimens of outer material from the palm area of the glove body component assembly when tested in accordance with IS 6489 (Part 2) after the pre-treatment specified in **5.4.2**, shall have the minimum tear resistance of 50 N.

6.3.3.2 Where different, the palm and back sides of the glove shall be tested. The performance shall be determined using the lowest mean of the results for each side.

6.3.4 *Puncture Resistance*

6.3.4.1 Specimens of outer material from the palm area of the glove body component assembly when tested in accordance with ISO 13996 after the pre-treatments specified in **5.4.2** and **5.4.3**, shall have the minimum puncture resistance of 100 N.

6.3.4.2 Where different, the palm and back sides of the glove shall be tested. The performance shall be determined using the lowest mean of the results for each side.

6.3.5 *Seam Breaking Strength*

If the glove assembly incorporates seams, seam breaking strength, when tested in accordance with IS/ISO 13935-2, shall have minimum seam breaking force of 350 N.

6.3.6 *Label Legibility*

Specimen glove labels when tested after pre-treatment as specified in **5.4.1** shall be legible at a distance of at least 30 cm by a person with 20/20 vision, or vision corrected to 20/20.

NOTE — The intention of this test is to ensure that the label remain readable after use.

6.4 Barrier Requirements

6.4.1 *Water Penetration Resistance*

Specimens of glove moisture barrier and its seams, when tested in accordance with ISO 811 at 7 kPa for a period of 5 min after the pre-treatments specified in **5.4.1** and **5.4.2**, shall not show appearance of water drops.

6.4.2 *Liquid Penetration Resistance*

Specimens of glove moisture barrier and its seams when tested in accordance with ISO 13994 using procedure C1 after the pre-treatment specified in **5.4.1**, shall not permit penetration of any liquid for minimum 1 h for the following liquids:

a) 40 percent sodium hydroxide at 20°C;
b) 36 percent hydrochloric acid at 20°C;
c) 30 percent sulfuric acid at 20°C; and
d) 50 percent toluene and 50 percent iso-octane (*v/v*).

6.5 Ergonomic Requirements

6.5.1 *Dexterity*

Specimen gloves, when tested for dexterity in accordance with the method given in Annex C after the pre-treatment specified in **5.4.1**, shall meet the requirement specified therein.

6.5.2 *Grip*

Specimen gloves when tested in accordance with Annex D after the pre-treatments specified in **5.4.1** and **5.4.3**, shall not have a weight pulling capacity less than 80 percent of the bare hand control values.

6.5.3 *Donning*

Specimen gloves, when tested in accordance with Annex E, after the pre-treatment specified in **5.4.1**, shall not have a donning time exceeding the baseline donning time plus 20 s.

6.6 Visibility

If required by the buyer, retroreflective material may be attached to the outermost surface of the gloves in such a way that they do not affect the performance of gloves.

7 MARKING AND INFORMATION

7.1 General

All information shall be precise and comprehensive, and provided at least in the official language(s) of the country of destination.

7.2 Marking

7.2.1 *Glove Marking*

7.2.1.1 Each protective glove shall be marked with the following information:

a) Name, trade-mark or other means of identification of manufacturer or his authorized representative;
b) Designation of the product type, commercial name or code (for allowing the user to identify clearly the product within the manufacturer's/ authorized representative's range);
c) Size designation;
d) If relevant, marking according to **7.2.3**; and
e) The pictogram as given in Fig. 3.

7.2.1.2 The marking shall be affixed so as to be visible legible and indelible throughout the foreseeable useful life of the glove. Marks or inscriptions which could be confused with the above marks shall not be affixed to the glove.

NOTE — The marking on the glove including pictograms is not sufficient in itself to convey comprehensive information about protection to the end-user. Therefore it should be considered only along with the information supplied by the manufacturer described in **7.3**.

7.2.2 *Marking of Packaging*

Each packaging enclosure that immediately contains the gloves shall be clearly marked with the following;

a) The information required in **7.3.1**;

b) The information required in **7.2.1.1** (b), (c) and (d);

c) Reference to where the information required in **7.3** may be obtained;

d) The pictogram as given in Fig. 3; and

e) Care labelling symbols as specified in IS 14452.

7.2.3 *Date of Obsolescence*

If the protective performance of the glove can be significantly affected by ageing, that is, one or more performance requirements are reduced within a year after glove production and before use, a date of obsolescence shall be indicated on gloves and packaging.

7.3 Information Supplied by the Manufacturer

The following minimum information shall be supplied when the protective glove is placed on the market, and shall be made available on request:

a) Name and full address of manufacturer or his authorized representative;

b) Glove designation as per **7.2.1.1** (b);

c) Information on the available size range;

d) Reference to this Indian Standard;

e) The pictogram as given in Fig. 3 and its explanation;

f) If appropriate, warnings against problems likely to be encountered shall be mentioned. As an example, a warning shall be given not to use the gloves next to moving machinery;

g) A list of the substances contained in the glove which are known to cause allergies. A list of substances contained in the gloves or list of raw materials shall be available upon request;

h) Instructions for use, and where relevant combination with other forms of PPE;

j) If relevant, care instruction including:

    1) Storage instruction; and
    2) Care symbols according to IS 14452 or explanations and an acceptable number of cleaning cycles.

k) Reference to accessories and spare parts, if relevant.

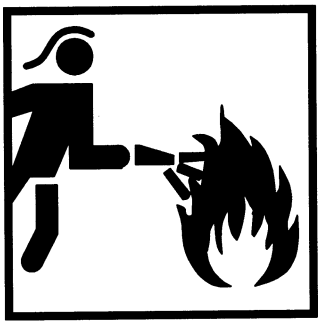


FIG. 3 PICTOGRAM ISO 7000-2418

7.4 BIS Certification Marking

The protective glove may also be marked with the Standard Mark.

7.4.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and Rules and Regulations made thereunder. The details of the conditions under which a license for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
1390 : 1983	Methods for determination of *p*H value of aqueous extracts of textile materials (*first revision*)
6359 : 1971	Method for conditioning of textiles
6489 (Part 2) : 2011	Textiles — Tear properties of fabrics: Part 2 Determination of tear force of trouser shaped test specimens (single tear method) (*second revision*)
12673 (Part 4) : 2014	Textiles — Determination of the abrasion resistance of fabrics by the martindale method: Part 4 Assessment of appearance change
14452 : 2014	Textiles — Care labelling code using symbols
15370 : 2005	Textiles — Domestic washing and drying procedures for textile testing
15758	Textiles — Protective clothing:
(Part 1) : 2007	Method of determining of heat transmission on exposure to flame
(Part 2) : 2007	Assessment of material assemblies when exposed to source of radiant heat
(Part 4) : 2007	Test method for limited flame spread
16258 : 2015	Leather — Chemical tests — Determination of *p*H
16259 : 2014	Leather — Chemical tests — Determination of chromium (VI) content
IS/ISO 13935-2 : 1999	Textiles — Seam tensile properties of fabrics and made-up textile articles: Part 2 Determination of maximum force to seam rupture using the grab method

ANNEX B

(*Clause* 5.1)

SAMPLING AND CRITERIA FOR CONFORMITY

B-1 LOT

For the purpose of conformance inspection and test sampling, a lot is defined as all the completed protective gloves of the same type, with same assemblies, produced in one facility, using the same production processes and materials, and being offered for delivery at one time to buyer against a dispatch note.

NOTE — Protective gloves of different sizes may be grouped in one lot.

B-2 For assessing the conformity of the lot to the requirements of this standard, the samples as given in col 3 of Table 2 shall be drawn at random from the lot.

Table 2 Sample Size

(*Clause* B-2)

Sl No. (1)	Number of Protective Gloves in the Lot (2)	Sample Size (No. of Protective Gloves) (3)	Permissible No. of Defectives (4)
i)	Up to 90	3	0
ii)	91-150	3	0
iii)	151-280	5	0
iv)	281-500	5	0
v)	501 and above	5	0

B-2.1 A protective gloves shall be considered defective, if it does not meet any of the requirements specified in this standard.

B-3 The lot shall be declared as conforming to the requirements of this standard, if no defective protective gloves is found.

ANNEX C

(*Clause* 6.5.1)

GLOVE FINGER DEXTERITY

C-1 NUMBER AND CONDITION OF TEST SPECIMEN

Four gloves shall be tested. The specimens are the entire gloves and shall be taken for test in the new (as made) condition. They shall not be softened by any special treatment for example tapping with a mellet or squeezing between rollers.

C-2 APPARATUS

A solid, centreless ground stainless steel test pin 40 mm long and of diameter 11 mm is required.

C-3 PROCEDURE

The pin shall be placed on a flat surface, for example a table top, and a trained operator wearing gloves shall pick up the pin by its circumference between his gloves forefinger and thumb without any other means of assistance. The operator shall pick up pin three times consecutively, without undue fumbling, within 30 s for all the four gloves.

ANNEX D

(*Clause* 6.5.2)

GRIP TEST

D-1 PRINCIPLE

The bare-handed lifting capacity of a test subject using a halyard and a set of weights is compared with the same test subject wearing wet gloves on a dry and wet halyard.

D-2 EQUIPMENT

Grip testing shall be conducted with a 9.5 mm diameter, 3-strand pre-stretched polyester rope attached to a calibrated force measuring device.

D-3 SPECIMENS

A minimum of three pairs of gloves each for sizes 6 and 11 shall be used for testing by at least two different test subjects. Each pair of gloves, as a complete set of gloves, shall be tested in the new, as-distributed condition. The laboratory shall ensure that glove specimens do not receive special softening treatments prior to tests. Glove specimens shall be conditioned as specified in **5.4.2** and **5.4.3**.

D-4 PROCEDURE

D-4.1 Test subjects shall be selected such that their hand dimensions are as close as possible to the hand length and to the hand circumference for sizes 6 and 11 (*see* Table 2).

D-4.2 Each test subject shall make three successive attempts to lift as much weight as possible using the halyard with both hands and keeping both feet firmly planted on the ground while pulling downward on the halyard. The average weight hoisted over the three trials shall be the bare-handed weight lift capability.

D-4.3 Dry-conditioned specimen gloves shall be tested on a dry rope and then on a wet rope.

D-4.4 Wet-conditioned specimen gloves shall be tested on a dry rope and then on a wet rope.

D-4.5 Each test subject shall be evaluated with a minimum of three pairs of gloves. Test subjects shall attempt one trial with each pair of gloves for a minimum of six grip tests for each set of conditions, with at least three grip tests with size 6 gloves and three grip tests with size 11 gloves.

D-4.6 The weight pulling capacity of a test subject with gloves shall be compared with the bare- handed weight lift capability. The percentage of weight pulling capacity with gloves to bare-handed weight lift capability shall be calculated as follows:

Percent of bare-hand control

$$= \frac{\text{Weight pulling capacity with gloves}}{\text{Bare-handed weight lift capability}} \times 100$$

D-5 REPORT

The percent of bare-hand control for each glove pair specimen, condition and test subject tested shall be reported. One or more glove pair specimens failing this test shall constitute failing performance.

ANNEX E

(*Clause* 6.5.3)

DONNING TEST

E-1 PRINCIPLE

Donning times are measured for gloves which have been repeatedly laundered to determine failure of liner attachments within glove.

E-2 SPECIMENS

A minimum of three pairs of gloves each for sizes small and large shall be used for testing by at least two different test subjects. Specimens shall be conditioned as specified in **5.4.1**.

E-3 PROCEDURE

E-3.1 The time to don one glove of the glove pair specimen shall be determined by measuring the time it takes for the test subject to don the single glove on three consecutive trials without altering the sample glove linings between donnings.

E-3.2 Each donning trial shall start with the glove lying in front of the test subject and end the trial when the test subject’s fingers are seated in the sample glove.

E-3.3 Glove pair specimens shall be conditioned as specified in **5.4.1**.

E-4 REPORT

The final donning time and the baseline donning time shall be reported to the nearest 0.1 s for each trial. The average final and baseline donning times shall be calculated and reported. The pass/fail performance shall be determined using the average final and base line donning times.

ANNEX F

(*Foreword*)

COMMITTEE COMPOSITION

Textiles Protective Clothing Sectional Committee, TXD 32

Organization	*Representative(s)*
Northern India Textile Research Association, Ghaziabad	Dr Arindam Basu (***Chairman***) Dr M. S. Parmar (*Alternate*)
E.I. DU Pont India Private Limited, Gurugram	Shri Manoj Jhaver Shrimati Vedika Kapoor (*Alternate*)
Aeronav Limited, New Delhi	Shri Sandeep Hora
Alok Industries Limited, Mumbai	Representative
Arvind Limited, Dist, Gandhinagar	Shri Narendra Kajale Shri Satyapriya Dash (*Alternate*)
Border Security Force, New Delhi	Shri Hansraj
Central Reserve Police Force, New Delhi	Shri Randhir Kumar Jha
Centre for Fire Explosive and Environment Safety, New Delhi	Dr R. P. Singh Shri Mahipal Meena (*Alternate*)
Confederation of Indian Industry, New Delhi	Shri Raja Bhattacharjee
Defence Bioengineering & Electromedical Laboratory, Bengaluru	Dr T. M. Kotresh Dr R. Indu Shekar (*Alternate*)
Defence Materials and Stores Research & Development Establishment, Kanpur	Dr Anurag Srivastava Dr K. K. Gupta (*Alternate*)
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Department of Jute & Fibre Technology, Institute of Jute Technology, Kolkata	Prof (Dr) A. K. Samanta
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Indian Institute of Technology, New Delhi	Dr V. K. Kothari
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Textiles Committee, New Delhi	Shri Parvej Ahmed Shri V. K. R. Machiraju (*Alternate*)
The Bombay Textile Research Association, Mumbai	Shrimati L. M. Chandrakala
TUV Rheinland India Pvt Ltd, Gurugram	Shri Charan Singh
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